# Design and implementation of CoMaDa instance on Raspberry Pi with link to WebMaDa and data collection networks (BA/MA)

Over several years a big IoT network called SecureWSN was established and continuously expended towards a trustworthy environmental monitoring framework for constrained networks. The network itself consists of 3 parts: (1) Data collection via constrained devices, (2) gateway component handling incoming data and managing the network called CoMaDa, and (3) a framework realizing backend and front-end for the end-user called WebMaDa. Several theses are available in those parts of SecureWSN.

At the moment the CoMaDa instance needs to be installed locally on a computer. CoMaDa is mainly a gateway function as an broker between the deployed constrained network and the WebMaDa allowing mobile access to the deployed network and data based on defined privileges. Thus, CoMaDa offers the following services:
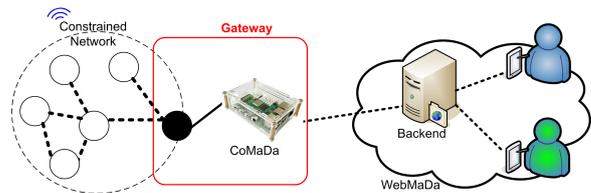
- **Co**nfiguration of sensor nodes building the constrained network collecting environmental data reporting in a push manner.
- **Ma**naging the deployed network offering services such as topology view, visualization of collected data and filtering data access to address transparency requests of users.
- **Da**ta handling is the last main service managing and handling the incoming data in respect to encrypt data, to translate data based on TinyIPFIX paradigm and to send them into the backend called WebMaDa. Reverse communication is also provided accordingly, especially for the direct pulling of data independent of pre-set report intervals.

As manifold devices can build the constrained network, differ operating systems (e.g., TinyOS, Contiki, RIOT OS) need to be supported by CoMaDa as well. Thus, two opportunities exist for designing and implementing CoMaDa on a Raspberry Pi:

1. Individual CoMaDa images for each operating system supporting the above mentioned services including all configuration opportunities for the constrained devices.
2. Similar as above, but offering the opportunity to support all operating systems in CoMaDa on one Raspberry Pi including an interface for the user to verify which is used for the deployed network.

The following things are requested to be designed, implemented, and evaluated (most likely via proof-of-concept) in this thesis:

- CoMaDa images for each the above mentioned options 1 or 2
- Interface to handle CoMaDa performing all requiring services
- Integration into the SecureWSN's architecture to achieve communication with WebMaDa supporting all available service in the current setup

Finally, the report needs to be written, as well as a detailed documentation on how to install the images on Raspberry Pi, how to use the solution (especially how to configure devices and to update the *config* files internally). Depending on the results we will try to publish it on high ranked conferences and workshops.

As this work is based on different works and research results, a willingness to familiarize oneself with the existing system is expected.
Knowledge in Java programming and little bit SQL, PHP, JavaScript, Angular would be an advantage.

We will offer you:
- Access to existing CoMaDa images for the operating systems available
- Access to written theses of SecureWSN
- Smart working environment
- Deep contact to supervisors and a lot of discussions and knowledge exchange

If you are interesting in this thesis contact us and let's discuss:

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